THE KENYA NATIONAL EXAMINATIONS COUNCIL
Kenya Certificate of Secondary Education

232/2 – PHYSICS – Paper 2

Nov. 2018 – 2 hours

Name ..... **Index Number** .....

Candidate's Signature ..... **Date** .....

Instructions to candidates

(a) *Write your name and index number in the spaces provided above.*
(b) *Sign and write the date of examination in the spaces provided above.*
(c) *This paper consists of **two** sections: **A** and **B**.*
(d) *Answer **all** the questions in sections **A** and **B** in the spaces provided.*
(e) *All working **must** be clearly shown in the spaces provided in this booklet.*
(f) *Non programmable silent electronic calculators may be used.*
(g) ***This paper consists of 16 printed pages.***
(h) ***Candidates should check the question paper to ascertain that all the pages are printed as indicated and that no questions are missing.***
(i) ***Candidates should answer the questions in English.***

For Examiner's Use Only

Section	Question	Maximum Score	Candidate's Score
A	1–14	25	
B	15	10	
	16	11	
	17	12	
	18	11	
	19	11	
	Total Score	80	

SECTION A (25 marks)

*Answer **all** the questions in this section in the spaces provided.*

1. Explain why the walls of a studio are padded with woollen materials. (2 marks)

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2. State **one** characteristic of soft X-rays that distinguish them from hard X-rays. (1 mark)

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3. **Figure 1** shows a bar magnet AB suspended by a string.

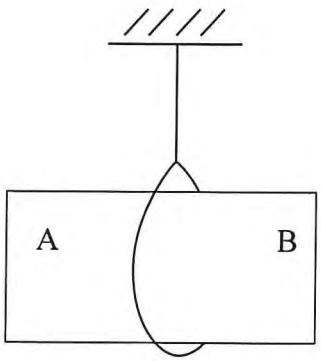

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Figure 1

When the North pole of another magnet is brought close to end A, there is repulsion. State the polarity of end B. (1 mark)

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4. State what happens to the image formed by a pin hole camera when the size of the hole is increased. (1 mark)

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5. The angle of incident for a ray of light moving from air to a certain liquid is 30°. Given that the refractive index of the liquid is 1.36, determine the angle of refraction. (2 marks)

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6. An electric kettle is rated 1.8 kW, 240 V. Determine the rating of the fuse that may be used in the kettle. (3 marks)

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7. **Figure 2** shows the image of an object O placed on the principle axis of a convex mirror.

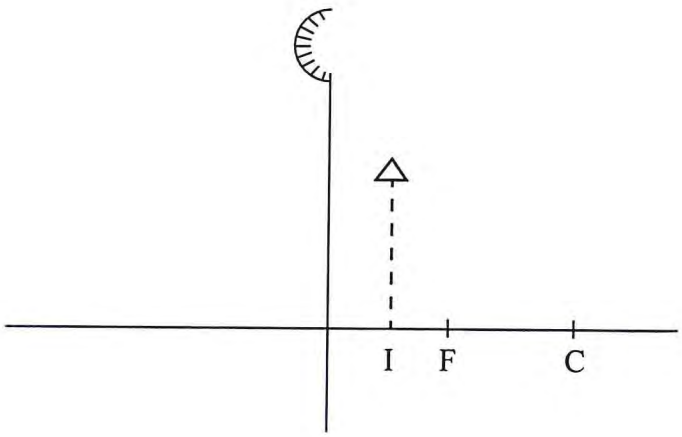

Figure 2

On the figure, draw a ray diagram to locate the object. (3 marks)

8. Define *radioactivity.* (1 mark)

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9. A transformer has 600 turns in the primary coil and 9000 turns in the secondary coil. If the transformer is 100% efficient and the current in the secondary coil is 0.15A, determine the current in the primary coil. (3 marks)

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10. The sharp point of a pin is brought near the cap of a positively charged electroscope. State and explain the observation made on the leaf of the electroscope. (3 marks)

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11. Arrange the following radiations in the order of increasing wavelengths;

Purple light, Gamma rays, infrared and ultraviolet. (1 mark)

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12. State the purpose of manganese (IV) oxide in a dry cell. (1 mark)

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13. State the meaning of the term *battery*.

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(1 mark)

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14. **Figure 3** shows two current-carrying wires A and B passing through a cardboard.

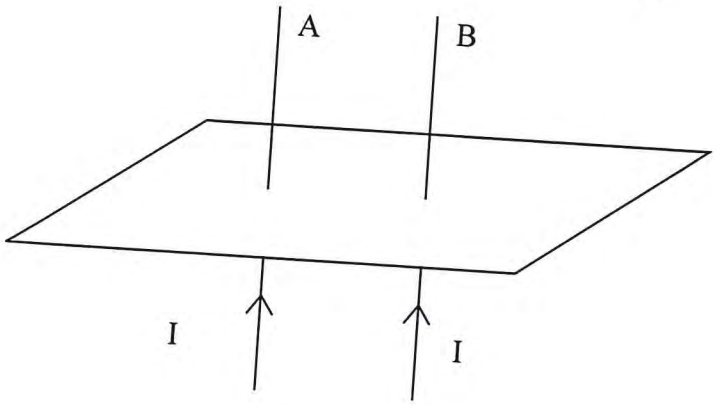

Figure 3

On the diagram, sketch the magnetic field lines around the wires to show how the fields interact.

(2 marks)

SECTION B (55 marks)

*Answer **all** the questions in this section in the spaces provided.*

15. (a) Electrical energy is transmitted at very high voltages and low current.

(i) Describe how the high voltages are attained. (1 mark)

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(ii) State **two** reasons why thick aluminium wires are preferred to copper wires for transmission over long distances. (2 marks)

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(b) **Figure 4** shows an electric cooker connected to the mains supply. X, Y and Z are the mains wires.

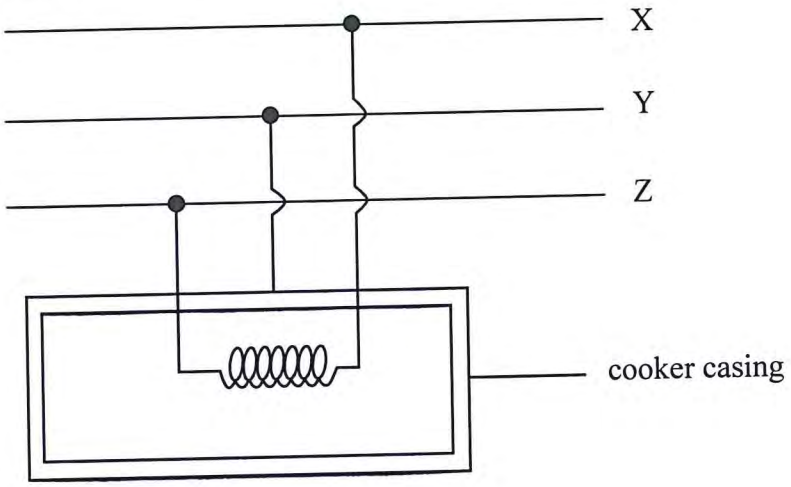

Figure 4

State with a reason the name of wire Y. (2 marks)

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(c) A student has some coloured bulbs rated 60 W, 240 V to be connected for decorations.

(i) State the number of such bulbs that can be connected normally to a 240 V supply through a 5A fuse. (2 marks)

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(ii) If the cost of electric energy is Ksh 3.00 per kWh, determine the cost of running the bulbs in (c) (i) for 5 hours daily for 20 days. (3 marks)

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16. (a) State the meaning of the following terms:

(i) *Photoelectric effect* (1 mark)

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(ii) *Threshold frequency* (1 mark)

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(b) **Figure 5** shows some light incident on the cathode of a photocell. The photocell is connected in series with a battery, a variable resistor and a microammeter.

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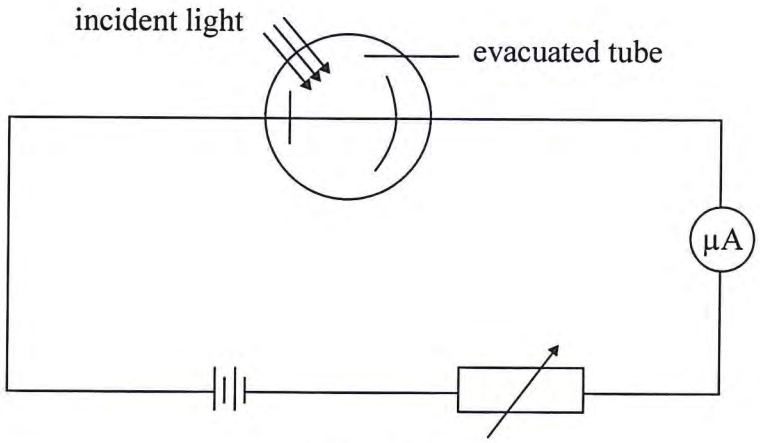

Figure 5

(i) Explain how the microammeter reading is affected when the intensity of the incident light is increased. (2 marks)

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(ii) State the reason why the tube is evacuated. (1 mark)

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(c) **Figure 6** shows a graph of maximum kinetic energy (KE_{max}) of photoelectrons against the frequency of the incident radiation.

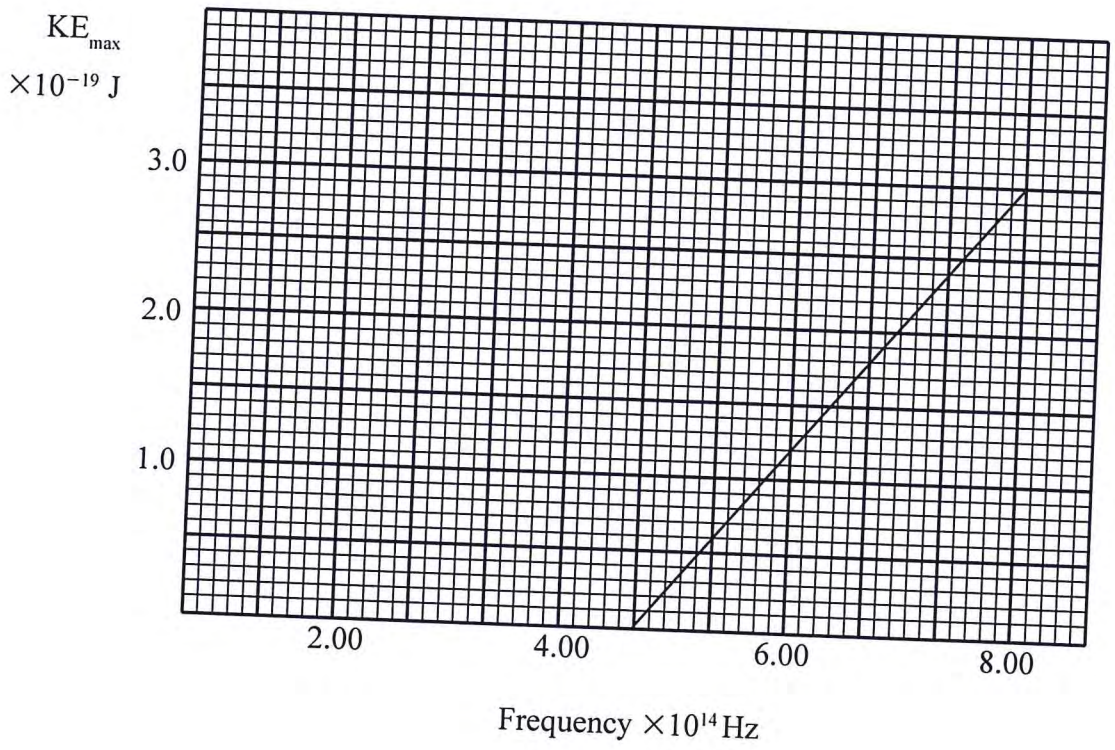

Figure 6

From the graph, determine:

(i) Plank's constant h,

(3 marks)

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(ii) the threshold wavelength λ_0 given that the speed of light C is $3.0 \times 10^8 ms^{-1}$.

(3 marks)

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17. (a) Water waves from a certain source move from the shallow end to the deep end. State the change that occurs at the deep end on the following:

(i) Frequency (1 mark)

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(ii) Wavelength (1 mark)

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(iii) Velocity (1 mark)

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(b) (i) A biconvex lens forms an upright image twice the size of the object. If the focal length of the lens is 20 cm, determine the object distance. (4 marks)

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(ii) State **two** optical instruments which produce a magnified real image using a convex lens. (2 marks)

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(c) State **one** difference between the working of the human eye and the lens of a camera. (1 mark)

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(d) A lens of focal length 20 cm forms a virtual image when an object is placed 60 cm from the lens. State with a reason the type of lens used. (2 marks)

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18. (a) (i) Draw a circuit diagram showing the depletion layer of a p–n junction diode connected in the reverse bias mode. (2 marks)

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(ii) State the reason why increasing the external voltage in (i) makes the depletion layer wider. (1 mark)

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(iii) State the meaning of *breakdown voltage* of a junction diode. (1 mark)

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(iv) State **one** application of diodes. (1 mark)

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(b) **Figure 7** shows the output on a screen of a CRO when an a.c. signal is connected to the y-plates with the time base on.

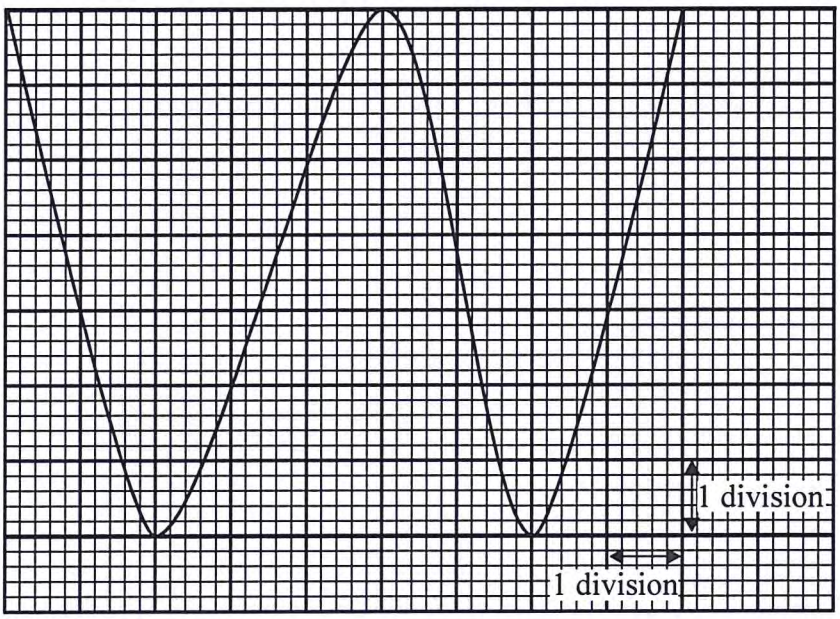

Figure 7

(i) Given that the time control is 5 ms per division and the y-gain is 100 V per division, determine the:

(I) frequency of the a.c. signal (2 marks)

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(II) peak voltage of the input signal (3 marks)

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(ii) State the adjustment that may be made in order to halve the frequency of the a.c. signal.
(1 mark)

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19. **Figure 8** shows two waves of nearly equal frequency produced simultaneously.

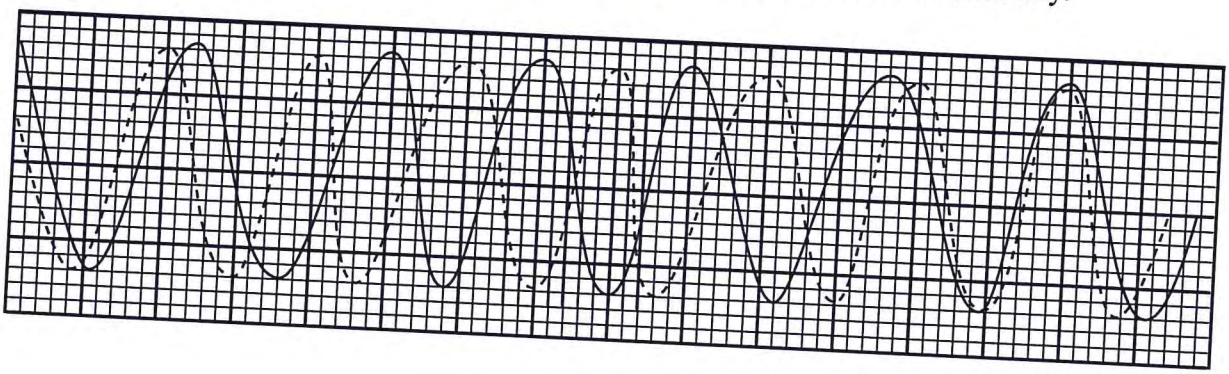

Figure 8

On the space provided, sketch the resultant of the two waves (beats). (2 marks)

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(b) **Figure 9(a)** and **9(b)** show barriers placed in the path of plane waves.

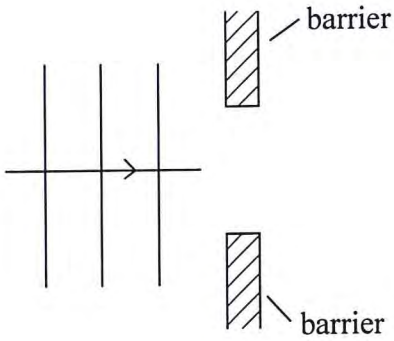

Figure 9(a)

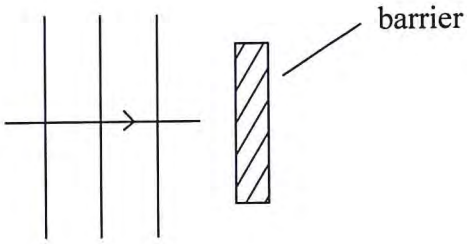

Figure 9(b)

On each figure, sketch the pattern of waves after they pass the barrier. (2 marks)

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(c) **Figure 10** shows a displacement–distance graph for a certain wave motion.

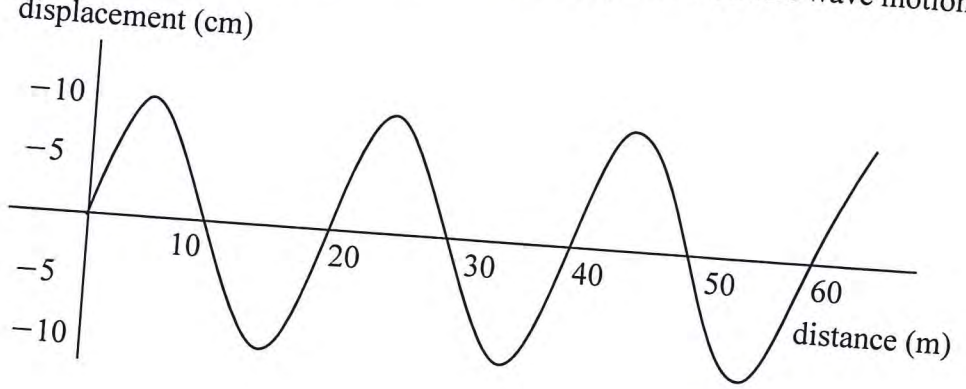

Figure 10

(i) Indicate on the figure with letters **A** and **B** any two points that are in phase. (1 mark)

(ii) Determine the:

(I) amplitude of the wave

(1 mark)

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(II) wavelength of the wave

(1 mark)

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(iii) Given that the frequency of the waves is 50 Hz, determine the:

(I) period (1 mark)

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(II) speed of the wave (3 marks)

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